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**Congress of the United States**  
**House of Representatives**  
**Washington, DC 20515-2107**

2108 RAYBURN HOUSE OFFICE BUILDING  
WASHINGTON, DC 20515-2107  
(202) 225-2836

DISTRICT OFFICES:

5 HIGH STREET, SUITE 101  
MEDFORD, MA 02155  
(781) 396-2900

188 CONCORD STREET, SUITE 102  
FRAMINGHAM, MA 01702  
(508) 875-2900  
[www.house.gov/markey](http://www.house.gov/markey)

June 21, 2004

The Honorable Tom Ridge  
Secretary  
Department of Homeland Security  
Washington, D.C.

Dear Mr. Secretary:

I am writing in response to a May 19, 2004 letter I received from Pamela J. Turner, Assistant Secretary of Homeland Security for Legislative Affairs, which responded to my March 10, 2004 letter to you regarding the vulnerability of liquefied natural gas (LNG) vessels to terrorist attacks.

Ms. Turner's letter suggests that concerns posed by Professor Jerry Havens of the University of Arkansas regarding: 1) the susceptibility of the foam insulation used on LNG carrier vessels to fire; 2) the possibility of rupture of the LNG containment system; and, 3) the potential for vapor pressure in the ship's LNG tanks to be elevated to levels beyond the capacity of the relief valves are either unfounded or are already being adequately addressed. I am writing you to request further information about the Department's basis for reaching such conclusions, based on contradictory evidence which is readily available from the public record.

First, Ms. Turner alleges in her letter that "foam polystyrene insulation, cited by Professor Havens, is not used on LNG carriers precisely because it's susceptible to melting and deformation in a fire."

This statement appears to be inaccurate. I am attaching, for your review, copies of several documents that touch on this issue. All three appear to contradict Ms. Turner's statement.

The first, issued by the Finnish LNG vessel manufacturer, Kvaerner Masa-Yards, contains a description of the "Kvaerner Moss LNG Tank Design." According to the document, "the majority of the world's present LNG fleet, including those on order, incorporate the Kvaerner Moss LNG tank design." This document goes on to state that "The design of the cargo tank insulation is based on panels made of expanded polystyrene." [emphasis added]

A second document (enclosed) which appears on the Kvaerner Masa-Yard website confirms that polystyrene is still being used by the company for its LNG carrier

vessels (see <http://www.masa-yards.fi/publications/pdf/LNG.pdf>). This publication describes the use of “inserts of very soft polystyrene for flexibility and fiberglass fibre reinforcement to absorb forces which are built up during the cooling down of the cargo tank.”

I am also informed that many of the LNG carrier vessels that employ the so-called “membrane” design in their storage containers may also use foam insulation, and that some of these may have used polystyrene or materials with similar flammability characteristics.

The second document, issued by the Japanese firm, Kawasaki Heavy Industries, Ltd., describes the “Kawasaki Panel System” and includes a description of the companies’ use of polyurethane foam and phenolic resin foam in LNG carriers. The U.S. Coast Guard web site contains a Circular 8-80, issued in 1980, which warns of the flammability of polyurethane foam (see [http://www.uscg.mil/hq/g-m/nvic/8\\_80/n8-80.pdf](http://www.uscg.mil/hq/g-m/nvic/8_80/n8-80.pdf)), and the OSHA website contains a Hazard Information Bulletin issued in May 1989 which warns that “Rigid polyurethane and polyisocyanurate foams will, when ignited, burn rapidly and produce intense heat, dense smoke and gases which are irritating, flammable and/or toxic” (see [http://www.osha.gov/dts/hib/hib\\_data/hib19890510.html](http://www.osha.gov/dts/hib/hib_data/hib19890510.html)).

In addition, I recently received a copy of the attached article, which is available from the GasTech web site (see <http://www.gastech.co.uk/page.cfm/Action=GasTechSearch/t=m>) entitled “Gas Carriers – Effects of Fire on the Cargo Containment System.” The article discusses some rather disturbing scenarios involving what could happen in the event that a fire on an LNG carrier vessel compromised the insulation. A copy of this study is attached.

In light of this information, I request that the Department explain the basis for Ms. Turner’s statement indicating that polystyrene foam is not used on LNG carriers. I also request that the Department report on whether other flammable insulating materials are used on such carrier vessels. I am extremely concerned that the Department does not appear to be taking this issue seriously, and I believe that the matter needs to be addressed in order for the public to have confidence that the federal government is taking every necessary step to address potential threats to public safety.

Ms. Turner also said that “the insulation on LNG carriers is a complex assembly of many layers” and that “each layer is tested for fire resistance, and its ability to stop the spread of a fire, before it can be used on LNG carriers in U.S. waters.” I have several questions about this statement, which I request that you answer:

1. Who in the federal government tests the insulation on LNG carriers for fire resistance?
2. Who is responsible for determining whether this insulation is acceptable for use on LNG carrier vessels operating in US waters?

3. What are the standards used by the federal government for determining whether or not the insulating materials used on LNG carrier vessels are acceptable?
4. What hazard analysis has been done to examine what would happen in the event that a fire on an LNG carrier vessel ignited the insulation or otherwise compromised it?
5. Are older ships required to be retrofitted with new insulation if they use insulating materials, like polystyrene, which have now been determined to be highly flammable? If not, why not? If so, how does the federal government verify that this has occurred?
6. In light of the post-9/11 threat, is there any plan by the Department, or by the Coast Guard, to review the safety standards applicable to LNG carriers (including fire safety standards) to determine whether they need to be upgraded to better address the threat of sabotage or terrorist attack?

Ms. Turner's stated in her letter, that "the relief valve capacity of LNG carriers is designed based upon exposure to fire." This statement appears to assume that the insulation will continue to function properly. My concern is that if the insulation should fail as the result of a fire, the relief valves would not be capable of handling the increased vapor pressure that would result, since they would not allow for a sufficient flow through the valves. Professor Havens has suggested that if this were to be the case, the vessels, which are designed for only a few pounds overpressure, would be endangered.

1. In the event that fire compromises the insulation on an LNG carrier vessel, does the Department of Homeland Security agree that it is possible for the relief valves to be incapable of handling the increased vapor pressure?
2. Has the Department done any analysis of the consequences of such an occurrence? If so, what has it concluded? If not, why has such an analysis not been performed.

Ms. Turner further suggests that concerns about the brittle fracture problem have been anticipated by U.S. regulations, which "require the use of a special crack-arresting steel in strategic locations throughout the vessel's hull." However, she goes on to acknowledge that "both the U.S. and international standards for LNG carriers were developed with the potential consequences posed by conventional maritime risks such as groundings, collisions, and equipment failures in mind." She then goes on to say that in recognition of the "new risks now possible in our post 9/11 world, the United States and the international community have responded by implementing additional operational security measures" under U.S. law and international maritime codes.

1. How does adoption of additional operational security measures suffice to address an issue – brittle fracture -- that seems to go to the fundamental design of an LNG tanker?

2. Might not terrorist threats require the use of additional measures to address the problem of brittle fracture of the ship's hull resulting from an LNG spill?
3. If so, what types of changes might be needed in the design and construction of future LNG carrier vessels?
4. Is the Department studying whether design changes might be needed to better protect LNG tankers from threats of terrorism or sabotage, or to mitigate the consequences of such attacks?

Thank you for your assistance and consideration in this matter. I request that a response be provided within 15 working days, or no later than July 12, 2004. Should you have any additional questions about this request, please contact Mr. Jeff Duncan of my staff at x52836.

Sincerely,

A handwritten signature in black ink that reads "Edward J. Markey". The signature is written in a cursive, flowing style.

Edward J. Markey  
Member of Congress